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IS 15947-1 (2012): Concrete Delivery Pipelines, Part 1:
Specification [MED 18: Construction Plant and Machinery]



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भारतीय मानक
कंक्रीट डिलिवरी पाइपलाइन
भाग 1 विशिष्टि

Indian Standard
CONCRETE DELIVERY PIPELINE
PART 1 SPECIFICATION

ICS 77.140.75; 91.100.30

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NEW DELHI 110002

FOREWORD

This Indian Standard (Part 1) was adopted by the Bureau of Indian Standards, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Mechanical Engineering Division Council.

Concrete delivery pipeline, as the name implies, is basically steel pipeline for delivery of pumped concrete from the concrete pump to the place of pouring. It consists of steel pipes and pipe bends which are connected with each other by quick locking pipe couplings. Assistance has been taken from DIN 24118 : 1984 'Construction machines and machines for building materials; concrete delivery pipelines; dimensions' for formulating this standard.

The first piece of pipeline of stationary concrete pump is generally a reducer pipe to match the size of concrete pump outlet and the rest of the pipeline. However, if the size of stationary concrete pump outlet is same as that of the pipeline, the first piece of pipeline is a short piece of pipe of approximate length 500 mm.

For stationary pipelines of short length (up to 30 m), the reducer pipe (or short piece of pipe) is a normal piece without any extra provision of tightening by clamping device.

In case of lengthy pipelines (beyond 30 m), the reducer pipe (or short piece of pipe) is provided with eyes for tightening by clamping device. This arrangement of eyes for tightening by clamping device is to avoid difficulty of re-assembly of lengthy pipelines after their dismantling.

In addition to pipe couplings, the accessories of concrete delivery pipeline like delivery hoses, shut-off valves (mechanical or hydraulic) and circular distributors are used during concreting operation. The accessories of concrete delivery pipeline like cleaning heads, cleaning balls and trap baskets (also called catch baskets) are used during cleaning operation of the pipeline after finish of concreting.

In view of the increasing use of concreting by concrete pump at construction projects and also in view of the fact that manufacture of concrete delivery pipeline has already been started in the country by some of the manufacturers, it is considered necessary to lay down standards for concrete delivery pipeline and general requirements for pipeline accessories.

To facilitate additions/alterations to the standard and for the convenience of the users, this standard has been formulated in two parts. The other part in the series is:

Part 2 General requirements for pipeline accessories

The composition of Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CONCRETE DELIVERY PIPELINE

PART 1 SPECIFICATION

1 SCOPE

This standard (Part 1) covers construction features, technological requirements, dimensions and designations of straight pipes, reducer pipes and pipe bends used in concrete delivery pipeline.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
1762 (Part 1) : 1974	Code for designation of steels: Part 1 Based on letter symbols (<i>first revision</i>)
2004 : 1991	Carbon steel forgings for general engineering purposes — Specification (<i>third revision</i>)
2102 (Part 1) : 1993	General tolerances: Part 1 (tolerances for linear and angular dimensions without individual tolerance indication) (<i>third revision</i>)
2932 : 2003	Enamel, synthetic, exterior: (a) Undercoating, (b) Finishing — Specification (<i>third revision</i>)
3601 : 2006	Steel tubes for mechanical and general engineering purposes — Specification (<i>second revision</i>)

IS No.

Title

10234 : 1982 Recommendations for general pipeline welding

3 CONSTRUCTION FEATURES

3.1 Concrete delivery pipeline (that is straight pipes, reducer pipes and pipe bends) conforming to this standard shall be manufactured from abrasion resistant, seamless steel pipes duly welded with machined flanges manufactured from abrasion resistant steel.

3.1.1 The steel pipes of concrete delivery pipeline shall conform to IS 3601. Pipes shall be hot finished seamless steel tubes complying with tube designation HFS 240. If required, the pipes may be cold-drawn to achieve the required diameter and thickness. The cold drawn seamless steel tubes shall comply with tube designation CDS 240. No heat treatment shall be required for hot finished pipes. But, cold-drawn pipes shall be normalized after the final cold draw pass at a temperature of 880-910°C. Tolerance limits of outside diameter and thickness of pipes shall be in accordance with Section 4 of IS 3601.

3.1.2 Carbon steel forgings of flanges shall conform to IS 2004. Chemical composition of the forgings shall comply with class 2 designation with carbon content not exceeding 0.22 percent. The steel forgings shall be normalized at a temperature of 880-910°C before machining. If required, the flanges may be fabricated from thick carbon steel plates of steel designation 20 C 8 [see IS 1762 (Part 1)].

3.1.3 At the discretion of the manufacturer, the flanges of concrete delivery pipeline may be sleeved and welded

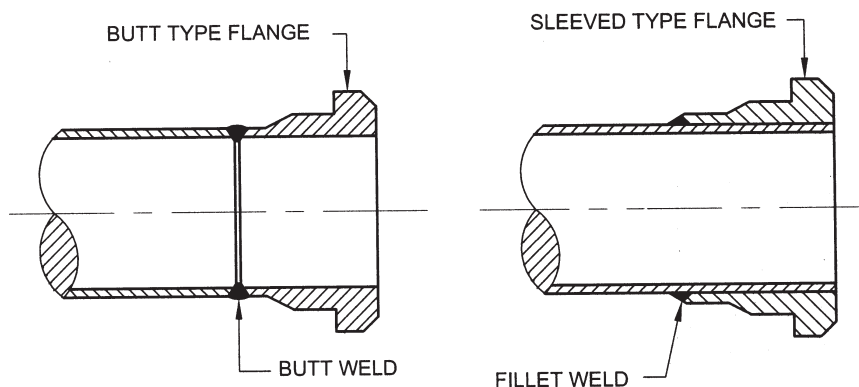


FIG. 1 WELDING OF CONCRETE DELIVERY PIPELINE

or butt-welded as shown in Fig. 1. Butt joints for welding of pipes and flanges shall be prepared in conformity with IS 10234. Flanges of ground pipeline (also called fixed pipeline or stationary pipeline) for stationary concrete pumps shall be of Type A (that is, Type A1 flange on one side and Type A2 flange on the other side of the pipe/bend) whereas flanges of pipeline for placement booms shall be of Type B as shown in Fig. 2.

3.1.4 Standard engineering practices/recommendations for welding (*see* IS 10234) shall be followed for welding of the flanges with straight pipes/reducer pipes/pipe bends for proper fusion of weld material. Welding shall be uniform and smooth.

3.1.5 Suitable holding arrangements like jigs/fixtures shall be deployed during welding of flanges with straight pipes/reducer pipes/pipe bends to avoid twist/unequal shrinkage.

3.2 Reducer pipes shall be fabricated from the pipes of nominal size equal to the large end of the reducer by suitable profile cutting and welding.

3.3 The profile of pipe bends shall be uniform and without any visible kink.

3.3.1 Precautions shall be taken to minimize thinning of pipes during bending process for making pipe bends. Wall thickness at bent portion of the pipe bends shall be within the permissible limits.

3.3.2 Pipe bends shall be made by cold bending process. However, pipe bends of size beyond 125 mm nominal bore made by hot bending process, shall also be acceptable subject to fulfillment of conditions given in **3.3** and **3.3.1**.

3.4 The outside surface of pipes, bends and reducer pipes shall be thoroughly cleaned to remove dirt/dust/grease, etc, before application of two coats (each of minimum 20 μ thick) of anti-corrosive primer and two coats (each of minimum 20 μ thick) of synthetic enamel paint of

light colour shade. The colour shade shall be as per agreement between the purchaser and the supplier. Synthetic enamel paints shall conform to IS 2932.

4 TECHNOLOGICAL REQUIREMENTS

4.1 Manufacturer's test certificates of seamless steel pipes and flanges meeting requirements of IS 3601 and IS 2004 shall be furnished by the supplier of concrete delivery pipeline to the purchaser.

4.2 A part of pipeline items shall be assembled with rubber sealing gaskets and pipe couplings at the works of the supplier of pipeline for pneumatic test at an air pressure of 10 kg/cm² in the presence of the purchaser. No leakage shall be permissible from the pipes and weld joints. However, for a test duration of 15 min, maximum drop of pressure up to 0.05 kg/cm² per coupling joint of pipeline shall be permissible.

4.3 Percentage of pipeline items to be assembled for pneumatic test shall be as per specific agreement between the purchaser and the supplier.

5 DIMENSIONS

5.1 Nominal bore of pipeline shall be at least two and a half times the highest size of the coarse aggregates to be used in pumpable concrete.

5.1.1 Pipeline for placement booms shall be of nominal bore 100 mm or 125 mm.

5.1.2 Pipeline for stationary concrete pumps shall be of nominal bore 100 mm or 125 mm or 150 mm or 180 mm depending upon the rating of the concrete pump (that is pumping pressure and discharge rate) and the size of aggregates used in concrete.

5.1.3 Pipes with 4.5 mm wall thickness may be used for practically all normal operations of concreting through concrete delivery pipeline, subject to the following maximum pumping pressures of concrete:

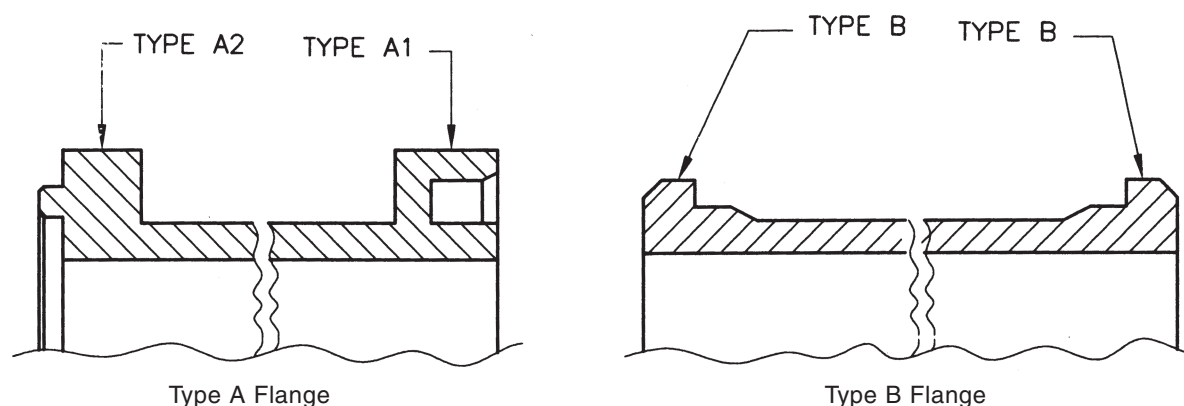


FIG. 2 FLANGES OF CONCRETE DELIVERY PIPELINE

- a) For 100 NB pipes, pumping pressure not to exceed 140 kg/cm²;
- b) For 125 NB pipes, pumping pressure not to exceed 110 kg/cm²; and
- c) For 150 NB pipes, pumping pressure not to exceed 90 kg/cm².

5.1.4 Pipes with 8 mm wall thickness shall be used for following higher pumping pressures of concrete pipes:

- a) For 100 NB pipes, pumping pressure not to exceed 230 kg/cm²;
- b) For 125 NB pipes, pumping pressure not to exceed 190 kg/cm²; and
- c) For 150 NB pipes, pumping pressure not to exceed 160 kg/cm².

NOTES

1 Friction that is flow resistance and consequently pumping pressure being inversely proportional to the pipeline diameter, higher diameter pipes are to be preferred to reduce pumping pressure. But large diameter pipes being heavier and difficult to be handled manually, a compromise shall be made for selection of pipeline diameter. Pipeline of 125 mm nominal bore is a good compromise. Pipeline of 100 mm nominal bore shall be more suitable for short lengths where concrete distribution is done through end hose by manual labour. Pipeline of 150 mm nominal bore shall be preferred for tunnel concreting where large size aggregates (up to 60 mm) are used and concrete distribution is mechanized.

2 Small diameter pipelines (100 mm or 125 mm nominal bore) shall be preferred over large diameter pipeline (150 mm or 180 mm nominal bore) to avoid bleeding of concrete for descending pipelines.

3 Wall thickness of pipe bends shall be a little higher than the thickness of straight pipes to take care of more wear and tear due to heavy friction.

4 A few thick walled pipes shall be used immediately after the concrete pump to take care of high pumping pressure and more wear and tear due to heavy friction. Thick walled pipes shall also be used in the vertical section of pipeline or for the portion of pipeline, which is difficult to dismantle and re-assemble.

5.2 Straight Pipes

The straight pipes (*see* Fig. 3) shall be of standard

lengths 500 ± 4 mm, 1 000 ± 4 mm, 2 000 ± 6 mm and 3 000 ± 8 mm.

5.3 Reducer Pipes

The reducer pipes (*see* Fig. 4) to match with the size of concrete pump outlet and rest of the pipeline or to serve as transition from larger to smaller diameter pipes, shall be of standard lengths 500 ± 4 mm, 1 000 ± 4 mm, 1 500 ± 6 mm, 2 000 ± 6 mm and 2 500 ± 8 mm.

5.4 Pipe Bends

5.4.1 For Placement Booms (*see* Fig. 5)

Standard radius (*R*) of pipe bends for placement booms shall be 250 ± 2 mm or 275 ± 2 mm, suiting to the requirements of the purchaser.

5.4.2 For Ground Pipelines (*see* Fig. 6)

Standard radius (*r*) of pipe bends of ground pipelines for stationary concrete pumps shall be ≈ 1 000 mm or ≈ 2 000 mm, suiting to the requirements of the purchaser.

5.5 Flanges

5.5.1 The profile and dimensions of Type A flanges (also called ‘Tongue and Groove’ or ‘Male and Female’ flanges) shall be as shown in Fig. 7.

5.5.2 The profile and dimensions of Type B flanges shall be as shown in Fig. 8.

6 DESIGNATION

The designation for straight pipes, reducer pipes and pipe bends, as explained hereunder, shall briefly cover their relevant details. The dimensions indicated in the designations shall be in mm. Thickness of pipes shall be indicated up to one decimal place.

Pipe (or reducer or bend) IS (Code No.) — Nominal bore I × Nominal bore II × Thickness — Length of pipe (or degree and radius of bend) and type of flanges.

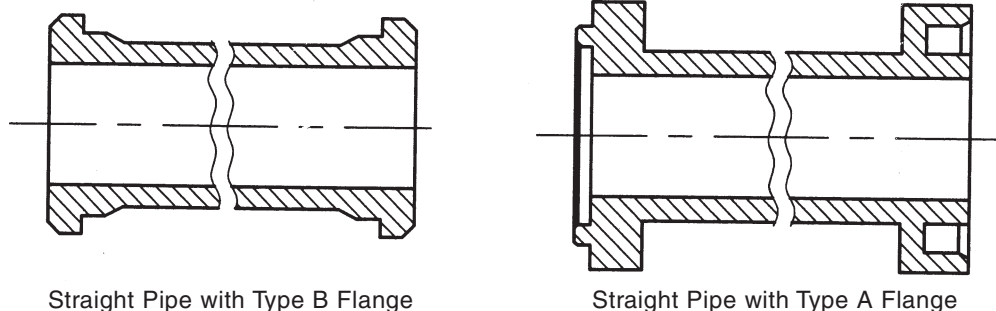
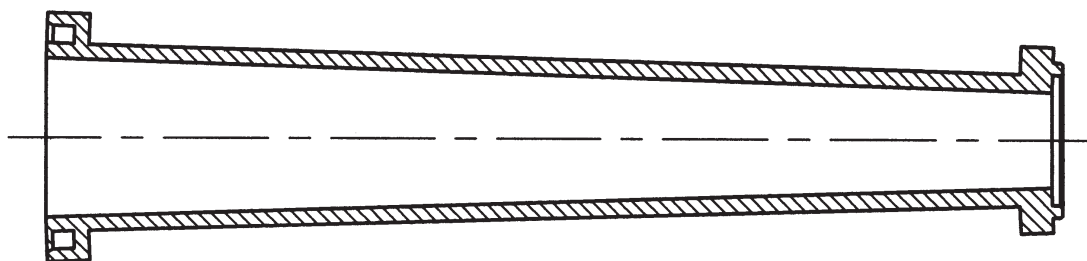
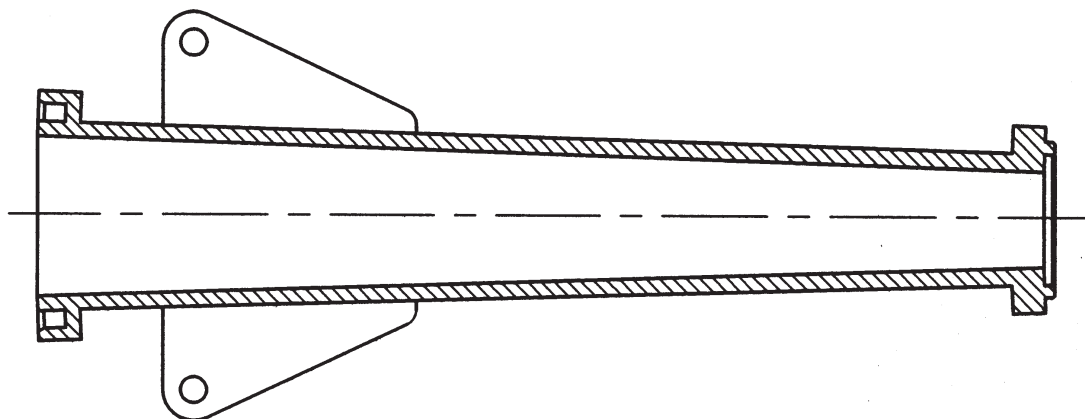


FIG. 3 STRAIGHT PIPE



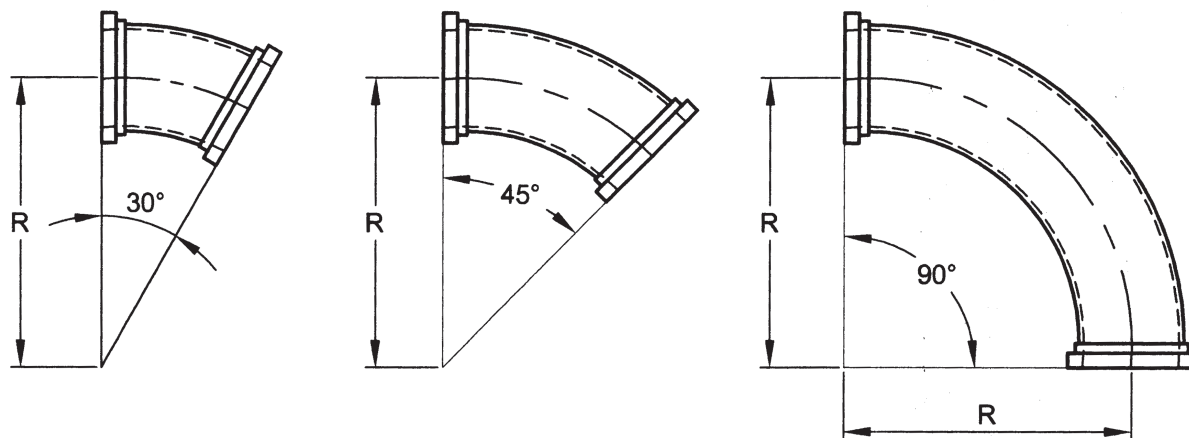
Reducer Pipe (Plain)



Reducer Pipe (with Eyes for Tightening by Clamping Device)

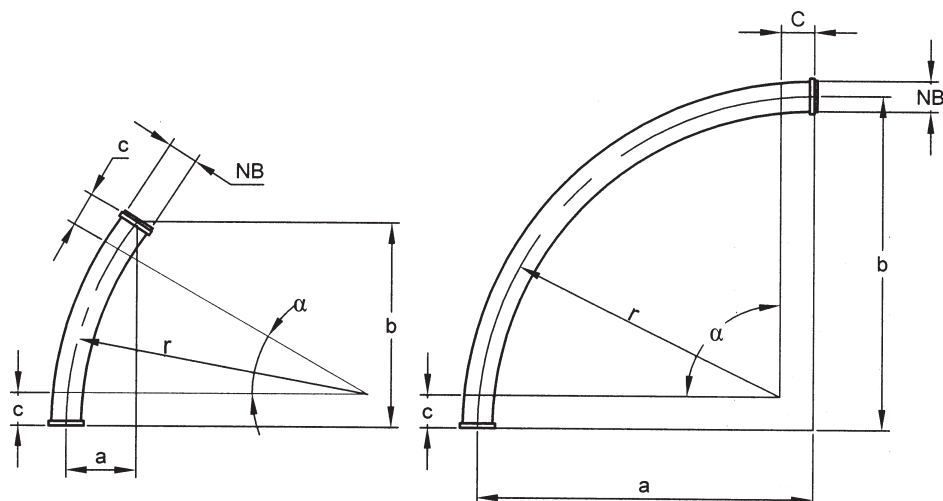
NOTE — Intermediate lengths of straight pipes and reducer pipes (*see 5.2 and 5.3*) may also be manufactured suiting to the specific requirements of the purchaser.

FIG. 4 REDUCER PIPE



NOTE — Radius (R) shall be 250 ± 2 mm or 275 ± 2 mm.

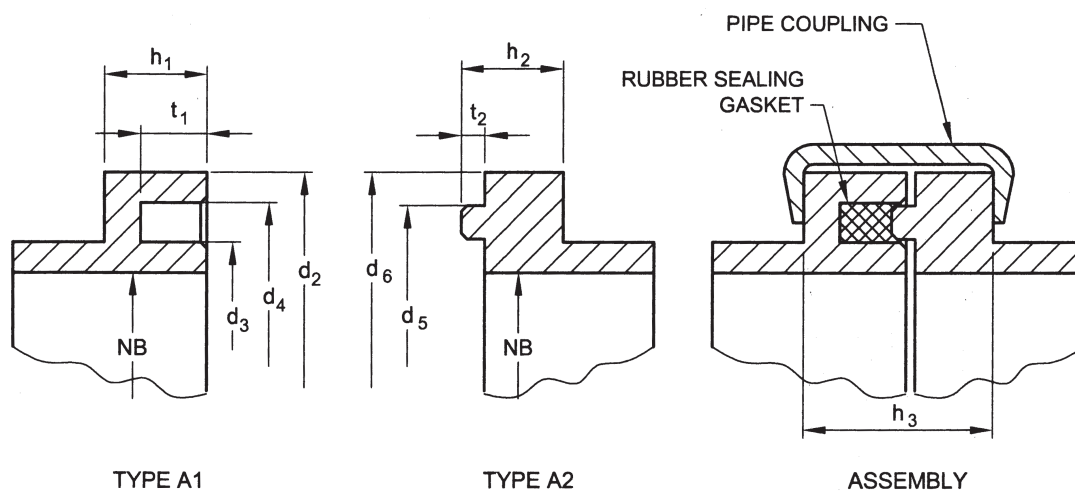
FIG. 5 PIPE BENDS FOR PLACEMENT BOOMS



Nominal Bore NB	$r \approx 1\,000$								$r \approx 2\,000$								c
	α								α								
	15°		30°		45°		90°		15°		30°		45°		90°		
	a ±20	b ±20	a ±20	b ±20	a ±20	b ±20	a ±20	b ±20	a ±20	b ±20	a ±20	b ±20	a ±20	b ±20	a ±20	b ±20	
100	65	475	190	705	370	895	1110	1110	100	735	325	1205	665	1605	2110	2110	110
125	75	555	210	780	400	965	1150	1150	110	815	345	1280	690	1670	2150	2150	150
150	85	650	235	875	435	1050	1200	1200	120	910	370	1375	730	1755	2200	2200	200
180	100	750	260	970	470	1135	1250	1250	135	1010	395	1470	765	1840	2250	2250	250

All dimensions in millimetres.

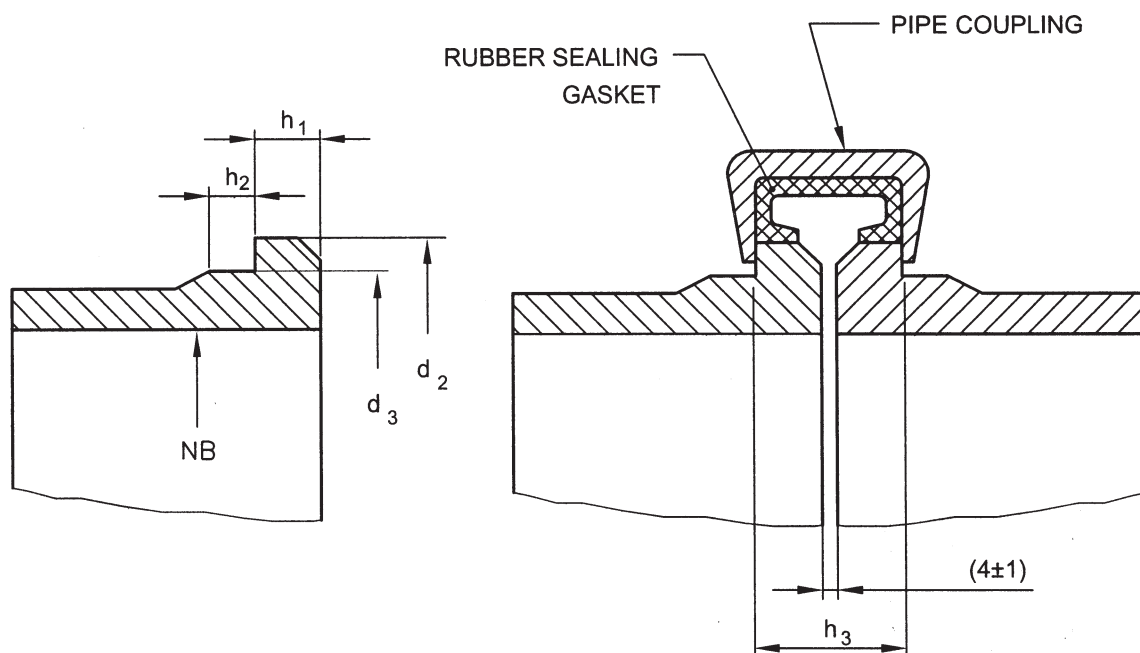
FIG. 6 PIPE BENDS FOR GROUND PIPELINES



Nominal Bore NB	d_2	d_3	d_4	d_5	d_6	h_1	h_2	h_3	t_1	t_2
100	134	111	124	112	122	17	17	31	11	4
125	178	142	164	144	162	22	25	45	12	4
150	196	163	185	165	183	22	25	45	12	4
180	227	193	215	195	213	22	25	44	12	3

All dimensions in millimetres.

FIG. 7 PROFILE OF TYPE A FLANGES



Nominal Bore NB	d_2	d_3	h_1	h_2	h_3
100	127	115	17	12	38
125	148	139	17	12	38

NOTE — Tolerance class 'm' (that is medium) shall apply to the machined flanges (see 5.5.1 and 5.5.2) as per IS 2102 (Part 1).

All dimensions in millimetres.

FIG. 8 PROFILE OF TYPE B FLANGES

Examples:

1. Designation of straight pipe of 125 mm nominal bore, 4.5 mm thick, 2 000 mm long with Type A flanges shall be:
Pipe IS 15947 (Part 1) — 125 × 125 × 4.5 — 2000 A
2. Designation of reducer pipe of 150 mm × 125 mm nominal bore, 6.3 mm thick, 1 500 mm long with Type A flanges shall be:
Reducer IS 15947 (Part 1) — 150 × 125 × 6.3 — 1500 A

3. Designation of 125 mm nominal bore, 5 mm thick, 90° Pipe Bend of 275 mm radius for placement boom with Type B flanges shall be:
Bend IS 15947 (Part 1) — 125 × 125 × 5.0 — 90° × 275 B

7 MARKING

Designation shall be marked with paint on the outer surface at middle portion of each item of concrete delivery pipeline (that is straight/reducer pipes and pipe bends).

ANNEX A*(Foreword)***COMMITTEE COMPOSITION****Construction Plant and Machinery Sectional Committee, MED 18**

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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